

ETHYL ACRYLATE

Ethyl acrylate is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 140-88-5



Molecular Formula: $\text{C}_5\text{H}_8\text{O}_2$

Ethyl acrylate is a colorless, flammable liquid which forms a transparent, elastic polymer on standing. The polymerization process is accelerated by heat, light, peroxides, and azeotropes. It has a pungent, acrid odor and is a lacrimator. Ethyl acrylate is soluble in alcohol and ether (Merck, 1989; Sax, 1989).

Physical Properties of Ethyl Acrylate

Synonyms: 2-propenoic acid ethyl ester; acrylic acid ethyl ester; ethyl propenoate

Molecular Weight:	100.11
Boiling Point:	99.4 °C
Melting Point:	-71.2 °C
Vapor Density:	3.45 (air = 1)
Density/Specific Gravity:	0.9234 at 20/4 °C (water = 1)
Log/Octanol Water Partition Coefficient:	1.32
Heat of vaporization:	8.27 kcal/mol
Water solubility:	2 g/100 ml at 20 °C
Conversion Factor:	1 ppm = 4.09 mg/m ³

(HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Ethyl acrylate is used primarily as an intermediate in the production of emulsion-based polymers (NTP, 1991). These are used in textile treatment, surface coatings, paper treatment, polishes, adhesives, leather treatment, and other emulsion-based polymers. Ethyl acrylate is also used in the production of other polymers (HSDB, 1991).

Ethyl acrylate was registered for use as a pesticide; however as of December 31, 1991, it is no

longer registered for pesticidal use in California (DPR, 1996).

The primary sources that have reported emissions of ethyl acrylate in California are manufacturers of plastics and synthetic materials, manufacturers of aircraft and parts, and manufacturers of electronic components and accessories (ARB, 1997b).

B. Emissions

The total emissions of ethyl acrylate from stationary sources in California are estimated to be at least 400 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Ethyl acrylate has been reported to be a volatile component of pineapple (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of ethyl acrylate. However, a 1990-91 United States Environmental Protection Agency (U.S. EPA) study reported all ambient concentrations of ethyl acrylate were below a detection limit of 0.83 microgram per cubic meter ($\mu\text{g}/\text{m}^3$) (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

Potential indoor sources of ethyl acrylate include latex paints, various waxes, polishes and sealants, and floor finishes (Hodgson and Wooley, 1991). Emissions of ethyl acrylate in environmental tobacco smoke from brands of cigarettes popular in California were below the detection limit of 3 $\mu\text{g}/\text{cigarette}$ (Daisey et al., 1994).

ATMOSPHERIC PERSISTENCE

Ethyl acrylate released to the atmosphere is expected to exist almost entirely in the gas phase based on its vapor pressure. The dominant atmospheric loss process for ethyl acrylate is expected to be by the reaction with the hydroxyl radical. The rate constant for this reaction has not been measured and its estimation is uncertain, although an upper limit to the rate constant can be estimated. Based on this estimated rate constant, the atmospheric half-life and lifetime is calculated to be greater than 10 hours and 15 hours, respectively (Atkinson, 1995). Its reaction products include epoxides and formaldehyde (Kao, 1994).

AB 2588 RISK ASSESSMENT INFORMATION

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics “Hot Spots” Program (AB 2588). Of the risk assessments reviewed as of April 1995, ethyl acrylate was not listed in any of the risk assessments (OEHHA, 1995).

HEALTH EFFECTS

Probable routes of human exposure to ethyl acrylate are inhalation and dermal contact.

Non-Cancer: Ethyl acrylate is a potent irritant of the eyes and respiratory tract. Acute inhalation exposure to ethyl acrylate has also been reported to cause adverse effects on the central nervous system and the gastrointestinal system in humans. Symptoms included lethargy, headache, convulsions and nausea (U.S. EPA, 1994a). Two manufacturers have reported sensitization through skin contact with the liquid (HSDB, 1991).

A chronic non-cancer Reference Exposure Level (REL) of $48 \mu\text{g}/\text{m}^3$ is listed for ethyl acrylate in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program, Revised 1992 Risk Assessment Guidelines. The toxicological endpoints considered for chronic toxicity are the kidney, gastrointestinal system, liver, and respiratory system (CAPCOA, 1993). The U.S. EPA has not established a Reference Concentration (RfC) or an oral Reference Dose (RfD) for ethyl acrylate (U.S. EPA, 1994a).

No information is available on human developmental or reproductive effects. Decreased body weights, but no major malformations, were observed in offspring of rats exposed to ethyl acrylate by inhalation (U.S. EPA, 1994a).

Cancer: The U.S. EPA has indicated that a causal relationship for an increased incidence of colorectal cancer in workers occupationally exposed to ethyl acrylate/methyl methacrylate has been suggested, but there is conflicting evidence regarding this relationship. The carcinogenicity of ethyl acrylate is under review by the U.S. EPA (U.S. EPA, 1995b). The International Agency for Research on Cancer has classified ethyl acrylate in Group 2B: Possible human carcinogen based on sufficient evidence in animals (IARC, 1987a). The State of California has determined under Proposition 65 that ethyl acrylate is a carcinogen (CCR, 1996).

